

### 1. The Value of Vaccines

"The concept of protective immunity existed long before as suggested by ancient Chinese custom of making children resistant to smallpox by having them inhale powders made from the skin lesions of patients recovering from the disease. Jenner, an English physician noticed that milk maids who had recovered from the cowpox never contracted the more serious smallpox. On the basis of this observation, he injected the material from a cowpox pustule into the arm of an 8-year-old boy. When the boy was later internally inoculated with smallpox the disease did not develop. Dr. Jenner's landmark treatise vaccination (Latin vaccinus of or from cows) was published in 1798. It led to the widespread acceptance of this method for inducing immunity to infectious diseases and vaccination remains the most effective method for preventing infections. An eloquent testament to the importance of immunology was the announcement by the World Health Organization (WHO) in 1980 that smallpox was the first disease that had been eradicated worldwide by a vaccination program". (Abbas, Lichtman & Pillai, 2015).

#### Chapter 1 – Properties and Overview of Immune Responses

**TABLE 1-1 Effectiveness of Vaccines for Some Common Infectious Diseases**

Disease	Maximum Number of Cases (Year)	Number of Cases in 2009	Percentage Change
Diphtheria	206,939 (1921)	0	-99.99
Measles	894,134 (1941)	61	-99.99
Mumps	152,209 (1968)	982	-99.35
Pertussis	265,269 (1934)	13,506	-94.72
Polio (paralytic)	21,269 (1952)	0	-100.0
Rubella	57,686 (1969)	4	-99.99
Tetanus	1,560 (1923)	14	-99.10
<i>Haemophilus influenzae</i> type B	~20,000 (1984)	25	-99.88
Hepatitis B	26,611 (1985)	3,020	-87.66

This table illustrates the striking decrease in the incidence of selected infectious diseases in the United States for which effective vaccines have been developed. Data from Orenstein WA, Hinman AR, Bart KJ, Hadler SC: Immunization. In Mandell GL, Bennett JE, Dolin R (eds.): *Principles and practices of infectious diseases*, 4th ed. New York, 1995, Churchill Livingstone; and *Morbidity and Mortality Weekly Report* 58:1458–1469, 2010.



2. The Efficacy of the COVID-19 Vaccine

- A. The Pfizer vaccine (BNT162b2 mRNA) is a "Two dose regimen of BNT162b2 conferred 95% protection against COVID 19 in persons 16 years of age or older. Safety over a median of 2 months was similar to that of other viral vaccines". (New England Journal of Medicine, 2020).
- B. The Moderna vaccine (Mrna-1273 SARS COV2) "The mRNA 1273 showed 94.1% efficacy at preventing COVID illness including severe disease aside from transient local or systemic reactions, no safety concerns were identified" (New England Journal of Medicine, 2021).

3. The Method of Transmission

- A. "When the virus travels in respiratory droplets when an infected person coughs, sneezes, talks, sings or breathes near you (within six feet). This is thought to be the main way COVID-19 is spread" (Cleveland Clinic, 2020).
- B. "When the virus travels in small respiratory droplets that linger in the air for minutes to hours from an infected person who is more likely to occur in enclosed spaces with poor ventilation" (Cleveland Clinic, 2020).
- C. "From close contact (touching, shaking hands) with an infected person" (Cleveland Clinic, 2020).
- D. "By touching surfaces that the virus has landed on, then touching your eyes, mouth, or nose before washing your hands (not thought to spread easily by this method)" (Cleveland Clinic, 2020).
- E. "What IS known is that people infected with COVID-19 can spread the virus to others before experiencing symptoms themselves (while people are still "asymptomatic"). Once you do have symptoms, the Center for Disease Control (CDC) says you are no longer contagious 10 days after your symptoms began" (Cleveland Clinic, 2020).
- F. "This so-called "incubation period", the time between becoming infected and showing symptoms, can range from two to 14 days. The average time before experiencing symptoms is five days. Symptoms can range in severity from very mild to severe. In about 80% of patients, COVID-19 causes only mild symptoms" (Cleveland Clinic, 2020).
- G. "People who have had close contact with a person who has a laboratory-confirmed or a suspected case of the COVID-19 virus. Close contact is defined as being within six feet of an infected person for a *cumulative* total of 15 minutes or more over a 24-hour period" (Cleveland Clinic, 2020).
- H. "On October 5, 2020, the CDC updated their COVID-19 webpage to say that there is growing evidence that COVID-19 infection can occur from airborne exposure to the virus under certain circumstances. Cases of transmission from people more than 2 meters apart have occurred but in enclosed spaces with poor ventilation, and typically with extended exposure to an infected person of more than 30 minutes. The CDC have been clear to point out that most infections are spread through close contact and that airborne transmission is not the primary route of transmission" (The Lancet, 2020).

4. Method of Prevention

- A. Wear your mask.
- B. Stay socially distant.
- C. Keep washing your hands.



D. Keep holiday gatherings small.

5. Environmental Risks (Ventilation)

A. "An important approach to lowering the concentrations of indoor air pollutants or contaminants including any viruses that may be in the air is to increase ventilation -the amount of outdoor air coming indoors. Ensuring proper ventilation with outside air can help reduce the concentration of airborne contaminants, including viruses, indoors. However, by itself, increasing ventilation is not enough to protect people from COVID-19" (EPA, 2021).

B. Cruise Ships

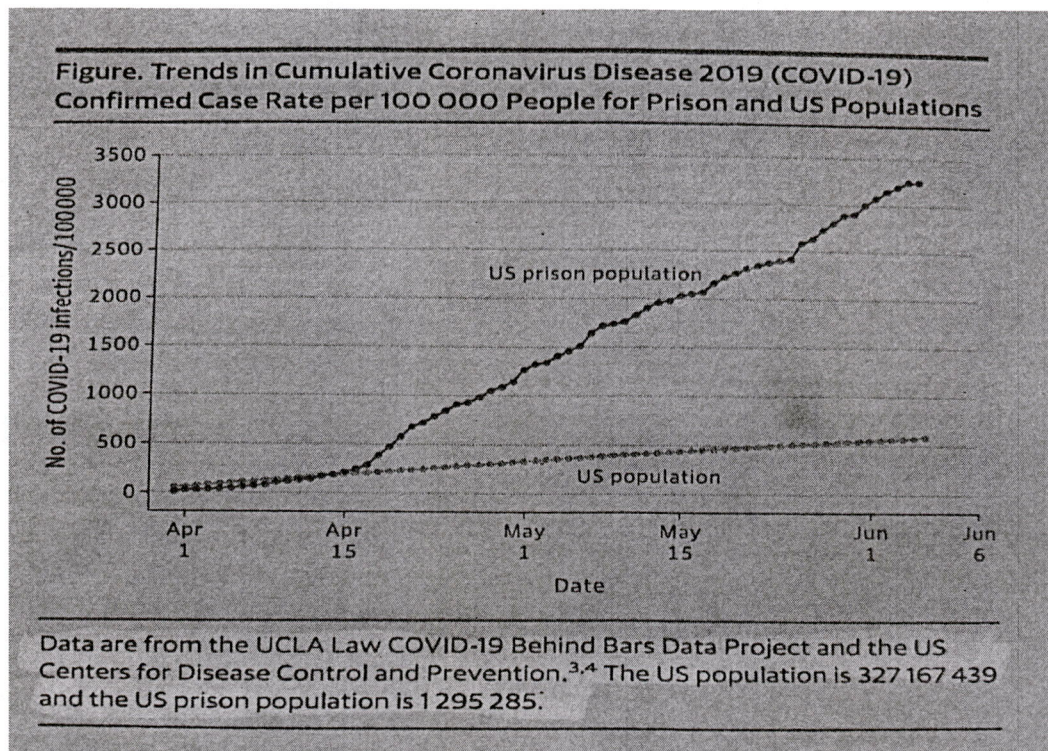
- a. "Eighty-one percent of COVID patients on cruise ships were asymptomatic" (Jefferson & Heneghay, 2020).
- b. "128 passengers and 95 crew were screened for COVID-19 symptoms including body temperatures before boarding no passengers from South East Asia were allowed onboard. The first severe case appeared on day eight. On day 20, 214 passengers and crew were tested and 59% were positive" (Jefferson & Heneghay, 2020).

C. Nursing homes

- a. Residents showed 26% rate of infection (Jama, 2021).
- b. Staff showed 50% rate of infection (Jama, 2021).

D. Prisons

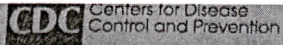
- a. Cumulative rate per 100,000 people for U.S. population was 500 (Jama, 2020).
- b. for prisons it was over 3,000 (Jama, 2020).



E. Recommendations for ventilation:

- a. "Increase outdoor air ventilation (use caution in highly polluted areas); with a lower population in the building, this increases the effective dilution ventilation per person" (ASHRAE Journal, 2020).
  - b. "Disable demand-controlled ventilation (DCV)" (ASHRAE Journal, 2020).
  - c. "Further open minimum outdoor air dampers, as high as 100%, thus eliminating recirculation (in the mild weather season, this need not affect thermal comfort or humidity, but clearly becomes more difficult in extreme weather" (ASHRAE Journal, 2020).
  - d. "Keep systems running longer hours, if possible 24/7 to enhance the two actions above" (ASHRAE Journal, 2020).
  - e. "Consider portable room air cleaners with HEPA filters" (ASHRAE Journal, 2020).
  - f. "Consider UVGI (ultraviolet germicidal irradiation), protecting occupants from radiation, particularly in high-risk spaces such as waiting rooms, prisons and shelters". (ASHRAE Journal, 2020).
  - g. It is likely that the ventilation system in an older building such as our Federal Courthouse is not sufficient. For example, a waiting room in an emergency department, would require a minimum total air change per hour of 12 or 23-35 minutes remove 99.9% of the contaminants (CDC, 2003).
6. Age stratified Risk of Death or Hospitalization from COVID-19 Infection.
- A. Risk of death over the age of 75-year-old (CDC, 2021)
    - a. 3,200 x that of 17 years
    - b. 71 x that of a 30-39 year-old
    - c. 24x that of a 40-49 year-old
    - d. 7.27x that of a 50-64 year-old





## COVID-19

# Risk for COVID-19 Infection, Hospitalization, and Death By Age Group

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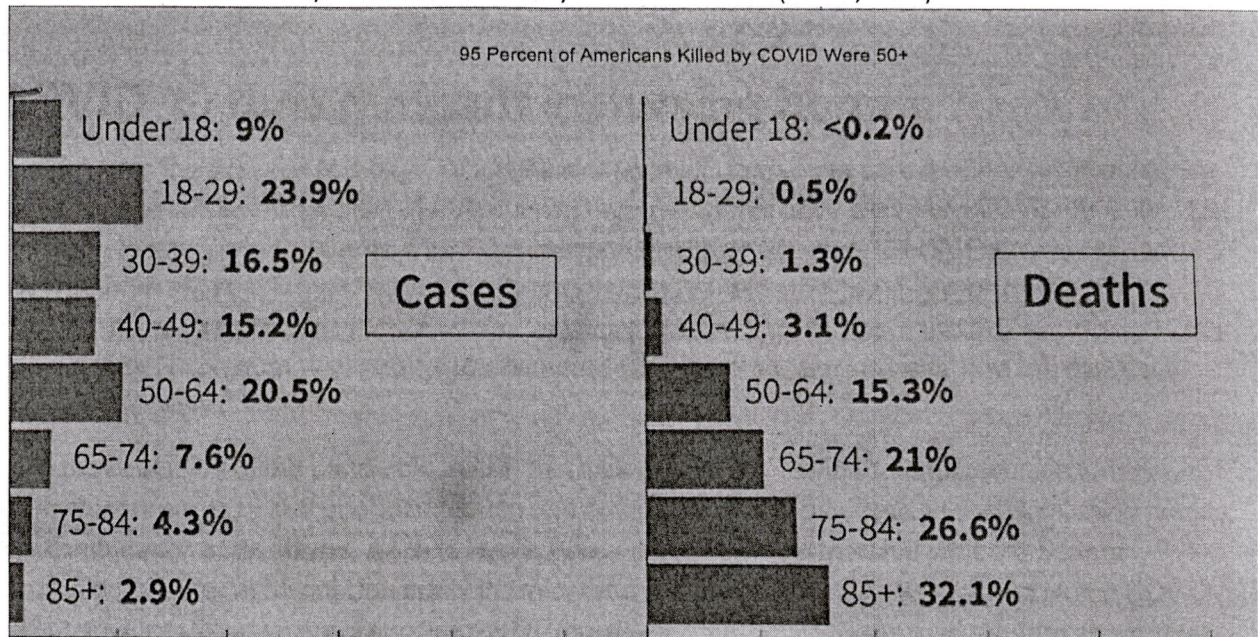
## Rate ratios compared to 5- to 17-year-olds<sup>1</sup>

	0-4 years old	5-17 years old	18-29 years old	30-39 years old	40-49 years old	50-64 years old	65-74 years old	75-84 years old	85+ years old
Cases <sup>2</sup>	<1x	Reference group	2x	2x	2x	2x	1x	1x	2x
Hospitalization <sup>3</sup>	2x	Reference group	6x	10x	15x	25x	40x	65x	95x
Death <sup>4</sup>	2x	Reference group	10x	45x	130x	440x	1,300x	3,200x	8,700x

All rates are relative to the 5- to 17-year-old age category. Sample interpretation: Compared with 5- to 17-year-olds, the rate of death is 45 times higher in 30- to 39-year-olds, and 8,700 times higher in those who are 85-plus.



B. 95% of American killed by COVID-19 were 50 years-old or older (AARP, 2021)



In summary, it is well established in medicine that vaccinations decrease the morbidity and mortality related to infectious diseases. COVID-19 vaccinations, likewise, decreased the death rate, hospitalization rate, and long-term sequelae of an acute infection. Non-vaccinated people, even with the best preventative measures, can transmit the infection at a higher rate than vaccinated people. Even though death rate may be low, they are potential exposing and causing an increase in medical costs, long-term pain and suffering and death of others. Those in the field who have high exposure rates (nursing home personnel, prisoners, transportation services, medical caregivers) should and do vaccinate to decrease harm to those they care for and protect. We need to vaccinate to protect everyone but especially those who are greater than 65 years old. A simple prick of a needle saves lives. Nearly 600,000 Americans have died from this virus if that population were vaccinated only 30,000 would have died.

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